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Disordered Eating Attitudes among Female Adolescents with Type 1 Diabetes Mellitus:
The Role of Mothers

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Abstract

Previous research has demonstrated that disordered eating among adolescent females with Type 1 Diabetes Mellitus is related to the weight loss and eating attitudes displayed by their mothers. The present research sought to examine the extent to which adolescents' perceptions of their mother's weight loss and eating attitudes and behaviours explained the adolescents' disordered eating attitudes and behaviours. Female adolescents and their mothers completed self-report questionnaires during outpatient clinic visits. Adolescents' perceptions of their mother's frequency of dieting behaviour and the importance of thinness to their mother were significant covariates of the adolescents' body dissatisfaction and drive for thinness. Attitudes about disordered eating were also explained by different elements of family cohesion and mothers' attitudes to weight loss. Routinely assessing perceptions of family and maternal attitudes and adopting a systemic approach to the care of adolescent females with Type 1 diabetes mellitus may help with the identification and management of these at risk adolescents.

Background

Adolescents with chronic illness are at greater risk of disordered eating than adolescents without chronic illness (Neumark-Sztainer et al., 1998). Furthermore, the prevalence rates of disordered eating among adolescent females with Type 1 Diabetes Mellitus (DM) are approximately twice as high as adolescent females who do not have DM (Rodin et al., 2002). Given that subclinical (forms of disordered eating below the level required for diagnosis of an eating disorder) disordered eating may be associated with poorer metabolic control and an increased risk of serious diabetes related complications (Pollock et al., 1995), it is important to attempt to explain the variation in disordered eating rates among adolescent females with Type 1 DM.

A range of individual and diabetes specific factors are postulated to play a role in the development and/or maintenance of disordered eating in Type 1 DM. However, research has shown that family factors are strong correlates of disordered eating among adolescent females with Type 1 DM after taking account of individual or disease-specific factors (Colton et al., 2007). Indeed, studies among adolescent females with diabetes have shown that those with disordered eating are more likely than those without disordered eating to describe their families as less supportive, less structured, more conflictual and less communicative (Maharaj et al., 1998; 2001; Neumark-Sztainer et al., 2002).

Previously published research has also demonstrated that maternal eating and weight control behaviours significantly predict eating disorders in adolescents (Colton et al., 2007). Communication about eating between parents and children is also shown to be important in the occurrence of dieting in children (Huon, 1996) and adolescent females

with Type 1 DM who engage in disordered eating are more likely (than adolescent females with Type 1 DM who do not engage in disordered eating) to experience negative comments about eating or weight from one of their parents in the development and/or maintenance of weight and shape concerns in adolescents.

Therefore, the existing evidence suggests that among female adolescents with Type 1 DM, disordered eating is associated with the attitudes towards eating and weight loss displayed by their mother and with their interpersonal relationships with their mother. The suggested process at work here is that the mother's attitudes will be conveyed to the adolescent female, and this will then manifest itself in disordered eating. However, there is an essential question in this process which has not yet been explored – is the disordered eating of the adolescent female with Type 1 DM associated with the attitudes or disordered eating of their mother per se or is it the adolescent's perception of their mother's attitudes which is important? The present study attempts to address this gap in our knowledge.

Methods

Participants were adolescent females diagnosed with Type 1 DM for at least 6 months and currently attending a Diabetes Clinic at a regional hospital. The mothers/female guardians of participants were also invited to take part in the study. All participants were provided with a questionnaire pack and pre-paid return envelope during attendance at an outpatients' clinic. The study received approval from the statutory research ethics committee. The questionnaire pack contained the following:

The Eating Disorders Inventory (EDI; Garner et al., 1983). The EDI assesses psychological and behavioural traits typical of eating disorders. Three subscales were used: Body Dissatisfaction, Drive for Thinness and Bulimia. These subscales were chosen as they are central and specific to eating disorders as operationalised in the Diagnostic and Statistical Manual (4th ed.) (DSM-IV; American Psychiatric Association, 1994) and have been used in other studies of persons with diabetes to screen for disordered eating (Daneman & Rodin, 1999). The EDI has demonstrated good reliability, with estimates of internal consistency for each scale ranging from 0.80 to 0.91, and validity has been demonstrated via factor analysis (Ebernez & Gleaves, 1994). The EDI was completed separately by the adolescent participants with diabetes and their mothers.

The Family Environment Scale (FES; Moos, 1974). The FES assesses the social-environmental characteristics of families. In this study, five subscales, which measure people's perceptions of their actual family environment, were used: Expressiveness, Cohesion, Conflict, Independence and Organization. Evidence for validity is provided by demonstrating the ability of the FES to discriminate between families categorised as distressed and those not categorised as distressed (Moos, 1974). Evidence for reliability (with internal consistency estimates ranging from 0.61 to 0.78) has also been provided (Moos & Moos 1976). The FES has been used previously in studies assessing the family environment of adolescents with Type 1 DM (Maharaj et al., 1998).

The adolescents' perceptions of their mothers' attitudes towards eating and weight loss were assessed by several items which asked about whether their mother encouraged them to diet, the importance of thinness to their mother and their beliefs about how often

their mother dieted or complained about weight. These items were based on those used in other studies investigating eating disturbances in young females (Byely et al., 2000).

For mothers, dieting behaviour was assessed by items which asked about the frequency of dieting and age at first diet. Mothers were also asked about their perceptions of the importance of thinness, the importance of appearance, their perception of their weight and their daughter's weight in comparison to others, whether or not they talk to their daughters about weight loss and whether they encourage weight loss. The discrepancy between the mothers' perception of their daughter's ideal weight and their daughter's current weight was calculated. Similar items have been used in previous research (Byely et al., 2000; Pike & Rodin, 1991).

The following information was also obtained for the adolescents: age, age at diagnosis of Type 1 DM, time since diagnosis and body mass index (BMI). BMI was transformed to standard deviation scores, adjusted for age and sex, as the fixed classifications of BMI are not appropriate for those under 18 years (Prentice, 1998). Information about the mothers' BMI, employment status, educational level, and early feeding difficulties of adolescents was also recorded.

Analysis

Hierarchical regression was used to model the correlates of EDI subscale scores (body dissatisfaction, drive for thinness and bulimia). Given the number of potential predictor variables included in the study, and given the exploratory nature of the study, correlation coefficients were used to select variables for inclusion in the regression analysis and a backward selection method was used within the regression model, in an

effort to produce the most parsimonious model. To be included in the regression model, variables were required to demonstrate a correlation with the outcome variables of at least an absolute value of 0.2.

In the subsequent hierarchical regression models, the adolescents' demographic and medical variables were entered as the first block; the mothers' EDI scores and mothers' attitudes towards eating were entered as the second block; the adolescents' assessments of the family environment were entered as the third block; and the adolescents' perceptions of their mothers' attitudes towards eating and weight loss were entered as the fourth block.

Results

In total, 82 female adolescents and their mothers were invited to participate in the study. Participation rate was 84% (69/82) for the female adolescents and 73% (60/82) for the mothers. Demographic characteristics of the sample are presented in Table 1. The majority of the participants (56/69; 81%) lived in two parent families.

Correlations between the adolescents' EDI subscale scores and the potential covariates are provided in Table 2. The final regression models are presented in Tables 3 to 5.

The regression model in Table 3 explained 24% of the variance in the EDI Bulimia scale (adjusted $R^2 = 0.20$; $F(3,56) = 5.824$, $p = .002$). The maternal variables explained 18% of the variance ($F \text{ change}(2,57) = 6.138$, $p = .004$), with the FES Independence scale contributing the additional 6% ($F \text{ change}(1,56) = 4.453$, $p = .039$).

The regression model in Table 4 explained 30% of the variance in the EDI Drive for Thinness scale (adjusted $R^2 = 0.25$; $F(4,55) = 5.789$, $p = .001$). The maternal variables explained 10% of the variance ($F \text{ change}(2,57) = 2.991$, $p = .058$), the FES Expressiveness scale contributed an additional 11% of the variance explained ($F \text{ change}(1,56) = 7.582$, $p = .008$) and the adolescents' perception of the importance of thinness to their mother added the final 9% ($F \text{ change}(1,55) = 7.297$, $p = .009$). In this model, the change in regression coefficients across blocks suggested that the adolescents' perception of the importance of thinness to their mother might be mediating the relationship between the EDI Drive for Thinness scale and whether mothers talked to their daughters about dieting.

The regression model in Table 5 explained 52% of the variance in the EDI Body Dissatisfaction scale (adjusted $R^2 = 0.47$; $F(4,38) = 10.445$, $p < .001$). The maternal variables explained 20% of the variance ($F \text{ change}(2,40) = 5.158$, $p = .010$), the FES Cohesion scale contributed an additional 5% of the variance explained ($F \text{ change}(1,39) = 2.523$, $p = .120$) and the adolescents' perception of how often their mother diets added the final 27% ($F \text{ change}(1,38) = 21.568$, $p < .001$).

Discussion

The primary purpose of this research was to determine whether female adolescents' (with Type 1 DM) perceptions of the attitudes of their mother towards dieting and weight loss contributed to the explanation of disordered eating attitudes and behaviour. The findings suggest that adolescents' perceptions of the importance of thinness to their mother are associated with the adolescents' drive for thinness and the

adolescents' perception of the frequency of their mother's dieting behaviour are associated with the adolescents' body dissatisfaction, even after controlling for demographic and medical variables, mothers' behaviour and attitudes towards eating and weight loss and family environment.

Indeed, the adolescents' perception of the frequency of their mother's dieting behaviour was the strongest covariate of body dissatisfaction in the model examined. It may be that the adolescents' perceptions of the frequency of their mother's dieting behaviour is a proxy measure of the adolescents' perception of their mother's dissatisfaction with their own body, i.e. the more mothers are perceived to engage in dieting behaviour, the more dissatisfied they are perceived to be with their body and this in turn impacts on the adolescent's perception of body dissatisfaction. Previous research has demonstrated that the dieting behaviour of mothers (Pike & Rodin, 1991) or the body dissatisfaction expressed by mothers (Davison, Markey, & Birch, 2000) is associated with body dissatisfaction among their daughters. However, the present research found that the adolescents' perception of the mother's dieting behaviour outweighed the mothers' report of their own body dissatisfaction or dieting behaviour in terms of explaining the adolescents' body dissatisfaction. This study, therefore, shows that it is the adolescent's perception which is key rather than the mother's self-report.

The same pattern was observed in explaining drive for thinness. In this case, one of the strongest covariates in the model was the adolescents' perception of the importance of thinness to their mother, yet the mother's self-report of the importance of thinness was not significantly correlated with the adolescents' drive for thinness.

It may be that the relationship between the adolescents' drive for thinness and body dissatisfaction and the mothers' reports of eating and weight loss attitudes and behaviour is mediated by the adolescents' perceptions. Unfortunately our sample size was not sufficient to examine these mediating pathways.

The assessments of disordered eating were all negatively related to different aspects of family environment. Lack of cohesion in the family (as reported by the adolescent) was found to be associated with body dissatisfaction; lack of expressiveness was found to be associated with drive for thinness; and lack of independence was found to be associated with bulimia. Previous research has shown that all scales of the FES (Maharaj et al., 1998), and the cohesion scale in particular (Neumark-Sztainer et al., 2002) are associated with disordered eating among adolescent females with Type 1 DM. The present research expands on this information by highlighting the specific types of family environment problems which are associated with the particular types of disordered eating.

Other research has shown that independence in the family environment is lower among females with bulimia than females without bulimia (Ackard & Neumark-Sztainer, 2001), which supports our findings here, although this previous research found that family environment was poor in general in the families of females with bulimia. The development of bulimia has been associated with overprotection of children by their mothers (Wade et al., 2001), which is a form of restraining independence. Overprotection by mothers of adolescents with Type 1 DM is not unusual, as the mothers strive to control the potential adverse consequences of diabetes (Wiebe et al., 2005). Therefore, adolescent females with Type 1 DM may be engaging in bulimic-type behaviour as a

reaction to this overprotection, in an effort to assert their independence (Anderson & Wolpert, 2004).

Adolescents' perceptions of body image and the desire for thinness are influenced to some extent by the media, particularly music videos (Groesz et al., 2002) and parents have an important role to play in moderating this potentially unhelpful influence (Derenne & Beresin, 2006). In a family environment characterized by low expressiveness, it is unlikely that conversations will take place to explore the adolescent's thoughts and feelings about thinness or it is unlikely that there is a sufficiently open atmosphere to allow the appropriateness of the adolescent's thoughts and feelings to be addressed. Perhaps, therefore, the lack of expressiveness in a family environment allows the development of unhelpful cognitions about thinness to develop.

Body dissatisfaction was found to be strongly associated with lack of family cohesion in the present study. Body dissatisfaction has also been linked with depression (Keel et al., 2001) and low self-esteem (Tiggemann, 2005). Given the link between low levels of family support (or cohesion) and low self-esteem (Cooper et al., 1983) and depression (Cumsille & Epstein, 1994) among adolescents, the finding of the present study is not surprising.

While interpreting these findings, it should be noted that there was a potential opportunity for mothers and daughters to collaborate on completion of the questionnaire provided in the study. Although they were asked to complete questionnaires separately, this could not be enforced and so, it is possible that some daughters' responses might have been influenced by their mothers or vice versa. This possibility potentially limits the generalisability of the findings.

In summary, the present study identifies several perceptions about mothers' behaviour and attitudes and the family environment, held by adolescent females with Type 1 DM, which should be considered when attempting to identify young females with Type 1 DM at risk for disordered eating attitudes and behaviour. These factors could be assessed using screening instruments or routine questioning during outpatient clinic visits. The findings suggest that a more systemic approach to diabetes treatment packages might be warranted. Wider based family interventions might include parenting advice about how to parent a young person with diabetes in such a way that enhances positive communication, promotes cohesion, and encourages expressiveness and independence especially in relation to diabetes management.

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Table 1

Demographic characteristics of the sample

	Mean (S.D.)
Age	15.8 (2.4)
BMI SDS	1.4 (0.9)
Time since diagnosis	6.7 (4.5)
Age at diagnosis	9.1 (3.6)
Mother's BMI	26.6 (5.3)

Table 2

Correlation coefficients (and significance values) between EDI scales and potential covariates

	EDI - Bulimia	EDI- Drive for Thinness	EDI Body Dissatisfaction
Age	-.004 (.974)	-.126 (.303)	-.019 (.877)
BMISDS	.144 (.238)	.253 (.036)	.408 (.001)
Age at diagnosis	.056 (.647)	.115 (.348)	-.065 (.594)
Time since diagnosis	-.047 (.702)	-.155 (.203)	.046 (.710)
Mother's BMI	.252 (.052)	.122 (.352)	.123 (.348)
Mother's EDI Bulimia	.203 (.121)	.124 (.346)	.012 (.929)
Mother's EDI Drive for Thinness	.211 (.106)	.281 (.030)	.139 (.288)
Mother's EDI Body Dissatisfaction	.260 (.044)	.171 (.191)	.129 (.327)
Mother has dieted	.232 (.074)	.268 (.039)	.264 (.042)
Mother encourages dieting	.305 (.018)	.293 (.023)	.315 (.014)
Mother's belief that daughter is heavier than ideal	.071 (.652)	.245 (.113)	.367 (.016)
Mother's frequency of dieting	.339 (.008)	.239 (.066)	.121 (.355)
Mother's importance of thinness	.198 (.130)	.187 (.152)	.204 (.119)
Mother considers self to be heavier than peers	.116 (.379)	.240 (.065)	.213 (.103)
Mother talks to daughter about dieting	.181 (.166)	.251 (.054)	.362 (.004)
Mother's importance of appearance	.141 (.281)	.081 (.539)	.083 (.527)

FES Cohesion	-.062 (.615)	-.227 (.061)	-.249 (.039)
FES Expressiveness	-.283 (.019)	-.253 (.036)	-.092 (.454)
FES Conflict subscale	.035 (.774)	.232 (.055)	.238 (.049)
FES Independence	-.251 (.038)	-.275 (.022)	-.170 (.162)
FES Organization	-.016 (.895)	-.161 (.185)	-.259 (.032)
Adolescent's perception of frequency of mother's dieting	.260 (.031)	.203 (.094)	.299 (.013)
Adolescent's perception of frequency of mother's complaints about weight	.228 (.059)	.327 (.006)	.295 (.014)
Adolescent's perception of importance of thinness to mother	.120 (.325)	.300 (.012)	.297 (.013)
Adolescent's perception that dieting is encouraged by mother	.140 (.251)	.140 (.250)	.228 (.059)

Table 3

Regression Model with EDI Bulimia as the Outcome Variable

	Unstandardized regression coefficients	Standardized regression coefficients	t	p
Constant	3.579		2.835	.006
Mother encourages dieting	.943	.251	2.127	.038
Mother's frequency of dieting	.355	.265	2.235	.029
FES Independence	-.331	-.248	-2.110	.039

Table 4

Regression Model with EDI Drive for Thinness as the Outcome Variable

	Unstandardized regression coefficients	Standardized regression coefficients	t	p
Constant	13.135		3.657	.001
Mother considers self to be heavier than peers	1.552	.234	2.034	.047
Mother talks to daughter about dieting	1.900	.149	1.285	.204
FES Expressiveness	-.890	-.341	-2.969	.004
Adolescent's perception of importance of thinness to mother	1.342	.310	2.701	.009

Table 5

Regression Model with EDI Body Dissatisfaction as the Outcome Variable

	Unstandardized regression coefficients	Standardized regression coefficients	t	p
Constant	16.671		2.968	.005
Mother considers self to be heavier than peers	3.010	.275	2.431	.020
Mother's belief that daughter is heavier than ideal	.353	.313	2.774	.009
FES Cohesion	-.917	-.247	-2.168	.036
Adolescent's perception of frequency of mother's dieting	2.987	.522	4.644	<.001